

What is claimed is:

1. A fluid machine, which is operable in a pump mode for pressurizing fluid and discharging the pressurized fluid from the fluid machine and is also operable in a motor mode for converting fluid pressure of fluid into kinetic energy and thereafter outputting the kinetic energy as mechanical energy, the fluid machine comprising:

a housing;

at least one movable member that is received in the housing, wherein each movable member defines a working chamber having a variable volume in the housing; and

a valve mechanism that opens and closes at least one communication passage arranged in the housing, wherein each communication passage communicates between the corresponding working chamber and a high pressure chamber, wherein:

the valve mechanism enables flow of fluid from each working chamber to the high pressure chamber and blocks backflow of fluid from the high pressure chamber to each working chamber at time of operation of the fluid machine in the pump mode; and

the valve mechanism opens at least one of the at least one communication passage at time of operation of the fluid machine in the motor mode.

2. The fluid machine according to claim 1, wherein:

the at least one communication passage includes:

a first communication passage, which conducts fluid

at the time of operation of the fluid machine in the pump mode;  
and

a second communication passage, which conducts fluid  
at the time of operation of the fluid machine in the motor mode;  
and

the valve mechanism includes:

a check valve, which opens and closes the first  
communication passage; and

an electric switching valve, which opens and closes  
the second communication passage.

3. The fluid machine according to claim 2, wherein the  
switching valve is a switching valve of a direct drive type, which  
includes a valve body and directly displaces the valve body of  
the switching valve to open and close the second communication  
passage.

4. The fluid machine according to claim 2, wherein the  
switching valve is a switching valve of a pilot type, which  
includes a valve body and indirectly displaces the valve body of  
the switching valve to open and close the second communication  
passage by controlling a back pressure applied to the valve body.

5. The fluid machine according to claim 1, wherein the valve  
mechanism includes:

a valve body, which is arranged in the high pressure chamber  
and opens and closes the at least one of the at least one

communication passage; and

an actuator, which forcefully displaces the valve body relative to the at least one of the at least one communication passage.

6. The fluid machine according to claim 1, further comprising a dynamo-electric machine that rotates in response to displacement of the movable member.

7. The fluid machine according to claim 6, wherein the dynamo-electric machine is located in the housing.

8. The fluid machine according to claim 1, further comprising a drive force transmission mechanism, which transmits drive force of a drive source to the movable member in a manner that selectively enables and disables transmission of the drive force from the drive source to the movable member.

9. The fluid machine according to claim 8, wherein a rotational axis of the drive force transmission mechanism is coaxial with a rotational axis of the movable member.

10. The fluid machine according to claim 1, wherein the movable member is a scroll.

11. The fluid machine according to claim 1, wherein:  
each movable member is a piston, which increases and

decreases the volume of the corresponding working chamber upon reciprocal movement of the piston;

in the pump mode, the valve mechanism communicates between a low pressure part located in the housing and the corresponding working chamber to supply fluid from the low pressure part to the corresponding working chamber while blocking backflow of fluid from the corresponding working chamber to the low pressure part and thereafter communicates between the corresponding working chamber to the high pressure chamber to supply fluid from the corresponding working chamber to the high pressure chamber while preventing backflow of fluid from the high pressure chamber to the corresponding working chamber; and

in the motor mode, the valve mechanism communicates between the high pressure chamber to the corresponding working chamber to supply fluid from the high pressure chamber to the corresponding working chamber while preventing backflow of fluid from the corresponding working chamber to the high pressure chamber and thereafter communicates between the corresponding working chamber and the low pressure part to supply fluid from the corresponding working chamber to the low pressure part while preventing backflow of fluid from the low pressure part to the corresponding working chamber.

12. The fluid machine according to claim 11, wherein the valve mechanism includes a valve body that is driven in synchronism with the reciprocal movement of each piston.

13. The fluid machine according to claim 11, further comprising a shaft, which is rotated in synchronism with the reciprocal movement of each piston through a converting mechanism, which converts rotational movement of the shaft into reciprocal movement of each piston, wherein the valve mechanism includes a valve body, which is connected to the shaft to rotate integrally therewith and is driven in synchronism with the reciprocal movement of each piston when the valve body is rotated by the shaft.

14. The fluid machine according to claim 13, wherein:

the valve body controls a communicational state between the low pressure part and the corresponding working chamber in the pump mode; and

the valve body controls a communicational state between the low pressure part and the corresponding working chamber and also controls a communicational state between the high pressure chamber and the corresponding working chamber in the motor mode.

15. The fluid machine according to claim 13, wherein the valve mechanism includes an actuator, which switches control operation of the fluid machine between the pump mode and the motor mode by displacing the valve body in a direction parallel to an axial direction of the shaft.

16. The fluid machine according to claim 14, wherein the valve mechanism further includes at least one check valve, which blocks

flow of fluid from the high pressure chamber into the corresponding working chamber.

17. The fluid machine according to claim 13, further comprising a dynamo-electric machine, which has a rotor securely connected to the shaft.

18. The fluid machine according to claim 13, further comprising a drive force transmission arrangement, which transmits drive force of an external drive source to the shaft.

19. The fluid machine according to claim 18, wherein the drive force transmission arrangement is a clutch that selectively enables and disables transmission of the drive force of the external drive source to the shaft.

20. The fluid machine according to claim 19, wherein:  
the dynamo-electric machine generates electric power in the motor mode; and

fluid is compressed and is discharged by the fluid machine through use of drive force supplied from at least one of the dynamo-electric machine and the external drive source in the pump mode.

21. The fluid machine according to claim 1, further comprising:  
a capacity variable mechanism that varies a capacity of each working chamber to vary a volume of fluid, which is

expandable in the corresponding working chamber at the time of operation in the motor mode; and

a control apparatus that controls the capacity variable mechanism to vary the capacity.

22. The fluid machine according to claim 21, wherein an increase or decrease in a flow rate of fluid supplied to the fluid machine is proportional to an increase or decrease in the capacity in the motor mode.

23. The fluid machine according to claim 21, wherein the control apparatus controls the capacity variable mechanism in such a manner that the capacity variable mechanism also varies a volume of refrigerant discharged from the working chamber in the pump mode.

24. The fluid machine according to claim 21, wherein:  
each movable member is driven to slide by a rotating drive shaft; and

the drive shaft is connected to one of a dynamo and an external drive source at the time of operation in the motor mode.

25. The fluid machine according to claim 21, wherein:  
each movable member is driven to slide by a rotating drive shaft; and

the drive shaft is connected to one of an external drive source and a motor in the pump mode.

26. A waste heat recovering system that recovers energy from heated vapor, which is heated by waste heat, the waste heat recovering system comprising a fluid machine, which is operable in a pump mode for pressurizing fluid and discharging the pressurized fluid from the fluid machine and is also operable in a motor mode for converting fluid pressure of fluid into kinetic energy and thereafter outputting the kinetic energy as mechanical energy, wherein the fluid machine includes:

- a housing;

- at least one movable member that is received in the housing, wherein each movable member defines a working chamber having a variable volume in the housing; and

- a valve mechanism that opens and closes at least one communication passage arranged in the housing, wherein each communication passage communicates between the corresponding working chamber and a high pressure chamber, wherein:

- the valve mechanism enables flow of fluid from each working chamber to the high pressure chamber and blocks backflow of fluid from the high pressure chamber to each working chamber at time of operation of the fluid machine in the pump mode; and

- the valve mechanism opens at least one of the at least one communication passage at time of operation of the fluid machine in the motor mode.